

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of: **Koji KAWAGUCHI**

Art Unit: **3656**

Application Number: **10/589,620**

Examiner: **Phillip A. Johnson**

Filed: **August 1, 2007**

Confirmation Number: **3827**

For: **TAPERED ROLLER BEARING**

Attorney Docket Number: **062901**

Customer Number: **38834**

SUBMISSION OF APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

March 29, 2011

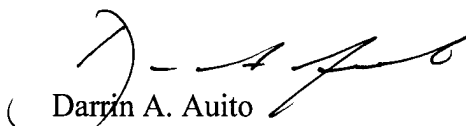
Sir:

Applicants submit herewith an Appeal Brief in the above-identified U.S. patent application.

Attached please find a payment in the amount of \$540.00 to cover the cost for the Appeal Brief. If any additional fees are due in connection with this submission, please charge Deposit Account No. 50-2866.

Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

APPEAL BRIEF FOR THE APPELLANT

Ex parte Koji KAWAGUCHI et al. (Applicant)

TAPERED ROLLER BEARING

Application Number: 10/589,620

Filed: August 1, 2007

Appeal No.:

Art Unit: 3656

Examiner: Phillip A. Johnson

Submitted by:
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March 29, 2011

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Art Unit: 3656

Appeal Brief
Attorney Docket No.: 062901

BRIEF ON APPEAL

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Art Unit: 3656

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(I) REAL PARTY IN INTEREST

The real party in interest is **JTEKT CORPORATION**, by an assignment recorded in the U. S. Patent and Trademark Office on **August 1, 2007**, at Reel **091629**, Frame **0871**.

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(II) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant, Appellant's legal representative, or assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

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(III) STATUS OF CLAIMS

Claims 1 and 2 are pending. Claims 1 and 2 are appealed.

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(IV) STATUS OF AMENDMENTS

No amendments have been filed subsequent to the final rejection.

(V) SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent Claim 1:

Independent claim 1 is directed to a tapered roller bearing. *See* FIGS. 1-5. Claim 1 recites an outer ring 20 having an outer ring raceway surface 21 undergoing crowning; an inner ring 10 having an inner ring raceway surface 11 undergoing crowning; and plural tapered rollers 30 having a rolling surface 31 undergoing crowning, which are located as rolling universally between said outer and inner ring raceway surfaces. *See* paragraphs [0005], [0010], [0011]. Claim 1 recites that the total crowning amount, defined as the sum of crowning amount of outer ring, the crowning amount of inner ring and two times the crowning amount of the roller, is more than 50 μm . *See* FIG. 6, paragraphs [0025], [0026], [0029]. Claim 1 recites that the crowning ratio of the outer ring, defined as crowning amount of outer ring divided by the total crowning amount, is 40% or more. *See* FIG. 7, paragraphs [0025], [0026], [0030]. Claim 1 recites that the roller crowning ratio, defined as two times the roller crowning amount divided by the total crowning amount, is 20% or less. *See* FIG. 8, paragraphs [0025], [0026], [0031].

Dependent Claim 2:

Dependent claim 2 is directed to the tapered roller bearing. *See* FIGS. 1-5. Claim 2 recites that the inner wheel crowning ratio, defined as crowning amount of inner ring divided by the total crowning amount, is 10% or more. *See* FIG. 9, paragraphs [0006], [0025], [0026], [0032].

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(VI) GROUND OF REJECTION TO BE REVIEWED ON APPEAL

The rejection of claims 1 and 2 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,086,261 to *Nakagawa et al.* is presented for review.

(VII) ARGUMENT

Independent Claim 1

Nakagawa et al. fails to disclose or render obvious the features of independent claim 1.

Issue 1:

Appellants submit that *Nakagawa et al.* does not disclose a technical idea, let alone define particular ranges of the total crowning amount and the crowning amount ratios of the outer ring, tapered roller and inner ring to the total crowning amount so as to achieve the presently claimed advantageous effects and unexpected results. Thus, it cannot be predicted by *Nakagawa* that the effect of rotation torque reduction is obtained in the specific ranges of the total crowning amount and the crowning amounts of inner and outer rings and tapered roller as indicated in Figs. 6-8 of the present application.

Nakagawa discloses that the tapered rollers are axially moved to be pressed against the cone back face rib face of the inner ring for allowing the tapered rollers to settle in their normal positions (col. 11, lines 54-58). When the tapered roller contacts the cone back face rib face in this manner, the rolling friction between the tapered roller and the internal ring increases as a matter of course, resulting in the increase of the rotation torque of the tapered roller bearing. This leads to a completely opposite effect to that of the present invention intending to decrease the rotation torque of a tapered roller bearing. As described above, *Nakagawa* clearly involves a negative result for the objective of the present invention.

As such, Appellants submit that the reliance on *Nakagawa* is improper.

Issue 2:

Appellants submit that it would not have been obvious to modify *Nakagawa et al.*, such that the total crowning amount, defined as the sum of crowning amount of outer ring 1, the crowning amount of inner ring 2 and two times the crowning amount of the roller 3 times, is more than 50 μm , and the crowning ratio of the outer ring 1, defined as crowning amount of outer ring 1 divided by the total crowning amount, is 40% or more, and the roller 3 crowning ratio, defined as two times the roller 3 crowning amount divided by the total crowning amount, is 20% or less, "since it has been held that discovering optimum value of a result effective variable involves only routine skill in the art." Office Action, page 3.

"The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575 (Fed. Cir. 1990).

Appellants submit that Figs. 6-9 show, for example, the criticality of the claimed range. The inventors conducted verification test(s) (results in Figs. 6-9) to clarify the relationship between the rotational torque of the tapered roller bearing, the total crowning amount, and each crowning ratio. Many different tapered roller bearings were prepared, in which the total crowning amount and each crowning ratio were set to various values, to experimentally measure the resultant rotation torque. **The test confirmed that the rotation torque of the tapered**

roller bearing decreases provided that the total crowning amount is 50 μm or more, the outer ring crowning ratio is 40% or more, and the roller crowning ratio is 20% or less.

Whereas, *Nakagawa's* roller crowning ratio is **greater than 20%**. As shown in the scatter graph illustrated in Fig. 8, when the roller crowning ratio is 20% or less (claimed range), the torque ratio stably scatters in a lower-value range in comparison with the case where the roller crowning ratio is more than 20% (*Nakagawa's* ratio is 23.1%). See paragraph [0031].

Also, *Nakagawa's* outer ring crowning ratio is **less than 40%**. As shown in the scatter graph illustrated in Fig. 9, when the outer ring crowning ratio is 40% or more, the torque ratio stably scatters in a lower-value range compared with the case in which the outer ring crowning ratio is less than 40% (*Nakagawa's* ratio is 38.5%). See paragraph [0030].

Nakagawa does not recognize that satisfying the claimed ranges reduces the rotational torque of the tapered roller bearing. Instead, *Nakagawa* only mentions that arrangement described in the specification and recited partly above (*e.g.*, col. 13, lines 9-13) "ensures smooth axial movement of the tapered roller 3 toward the cone back face rib face 2c during the running-in operation and shortens the running-in operation time." See Col. 13, lines 13-17.

Thus, the particular claimed ranges are critical and achieve unexpected results relative to the *Nakagawa et al.* range

As such, Applicants submit that a prima facie case of obviousness has not been presented.

Dependent Claim 2:

Nakagawa et al. fails to disclose or render obvious the features of independent claim 1.

Issue

Claim 2 properly depends from independent claim 1. In view of the above remarks, Appellants submit that the features of dependent claim 2 are not disclosed or rendered obvious by the cited reference.

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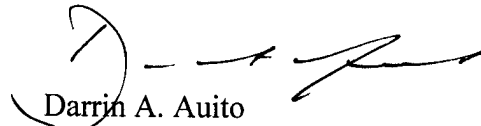
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(VIII) CONCLUSION

If this paper is not timely filed, Appellants hereby petition for an appropriate extension of time. The fee for any such extension may be charged to Deposit Account No. 50-2866, along with any other additional fees that may be required with respect to this paper.

Respectfully submitted,

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP



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(IX) CLAIMS APPENDIX

Claim 1 (Previously Presented): A tapered roller bearing comprising:

an outer ring having an outer ring raceway surface undergoing crowning;

an inner ring having an inner ring raceway surface undergoing crowning; and

plural tapered rollers having a rolling surface undergoing crowning, which are located as rolling universally between said outer and inner ring raceway surfaces, wherein

the total crowning amount, defined as the sum of crowning amount of outer ring, the crowning amount of inner ring and two times the crowning amount of the roller, is more than 50 μm ,

the crowning ratio of the outer ring, defined as crowning amount of outer ring divided by the total crowning amount, is 40% or more, and

the roller crowning ratio, defined as two times the roller crowning amount divided by the total crowning amount, is 20% or less.

Claim 2 (Previously Presented): The tapered roller bearing is according to claim 1, wherein the inner wheel crowning ratio, defined as crowning amount of the inner ring divided by the total crowning amount, is 10% or more.

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(X) EVIDENCE APPENDIX

n/a

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(XI) RELATED PROCEEDINGS APPENDIX

n/a